Revascularization Outcomes in Symptomatic Elderly with Peripheral Arterial Disease

The ROSE-PAD study

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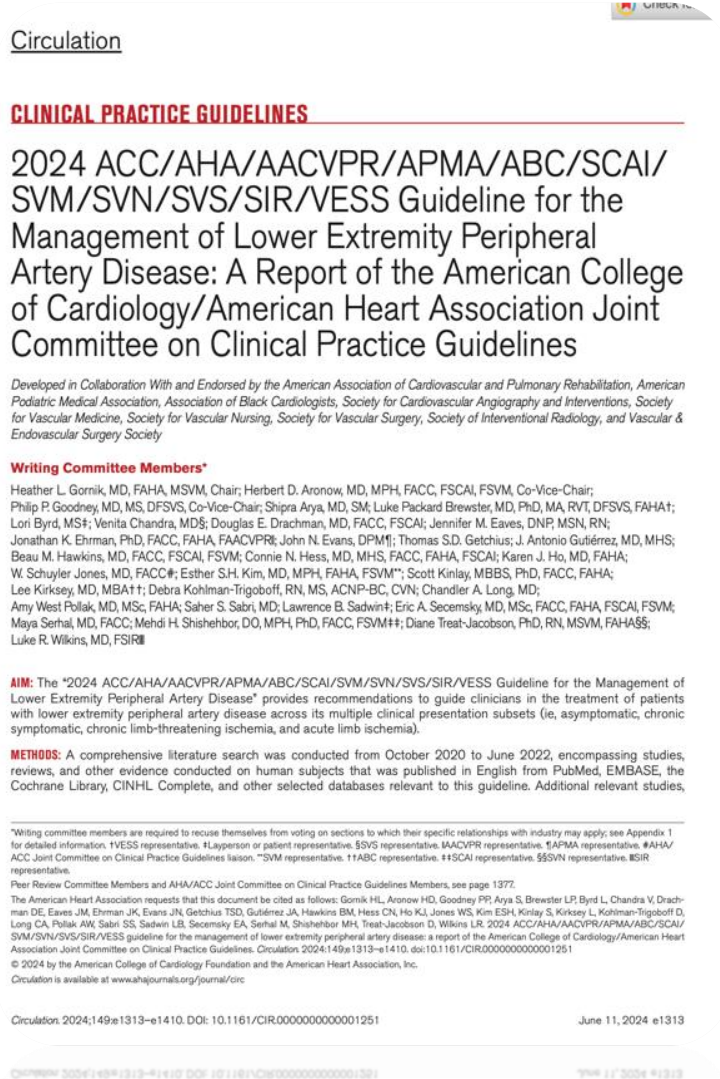
Important position documents 2024



Circulation

CLINICAL PRACTICE GUIDELINES

2024 ACC/AHA/AACVPR/APMA/ABC/SCAI/SVM/SVN/SVS/SIR/VESS Guideline for the Management of Lower Extremity Peripheral Artery Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Developed in Collaboration With and Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, American Podiatric Medical Association, Association of Black Cardiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine, Society for Vascular Nursing, Society for Vascular Surgery, Society of Interventional Radiology, and Vascular & Endovascular Surgery Society

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AIM: The "2024 ACC/AHA/AACVPR/APMA/ABC/SCAI/SVM/SVN/SVS/SIR/VESS Guideline for the Management of Lower Extremity Peripheral Artery Disease" provides recommendations to guide clinicians in the treatment of patients with lower extremity peripheral artery disease across its multiple clinical presentation subsets (ie, asymptomatic, chronic symptomatic, chronic limb-threatening ischemia, and acute limb ischemia).

METHODS: A comprehensive literature search was conducted from October 2020 to June 2022, encompassing studies, reviews, and other evidence conducted on human subjects that was published in English from PubMed, EMBASE, the Cochrane Library, CINHL Complete, and other selected databases relevant to this guideline. Additional relevant studies,

*Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry may apply; see Appendix 1 for detailed information. †VESS representative. ‡Layperson or patient representative. §SVS representative. ‖ACVPR representative. ¶APMA representative. #AHA/ACC Joint Committee on Clinical Practice Guidelines liaison. **SVM representative. ††ABC representative. ‡‡SCAI representative. §§SVN representative. ‖‖SIR representative.

Peer Review Committee Members and AHA/ACC Joint Committee on Clinical Practice Guidelines Members, see page 1377.

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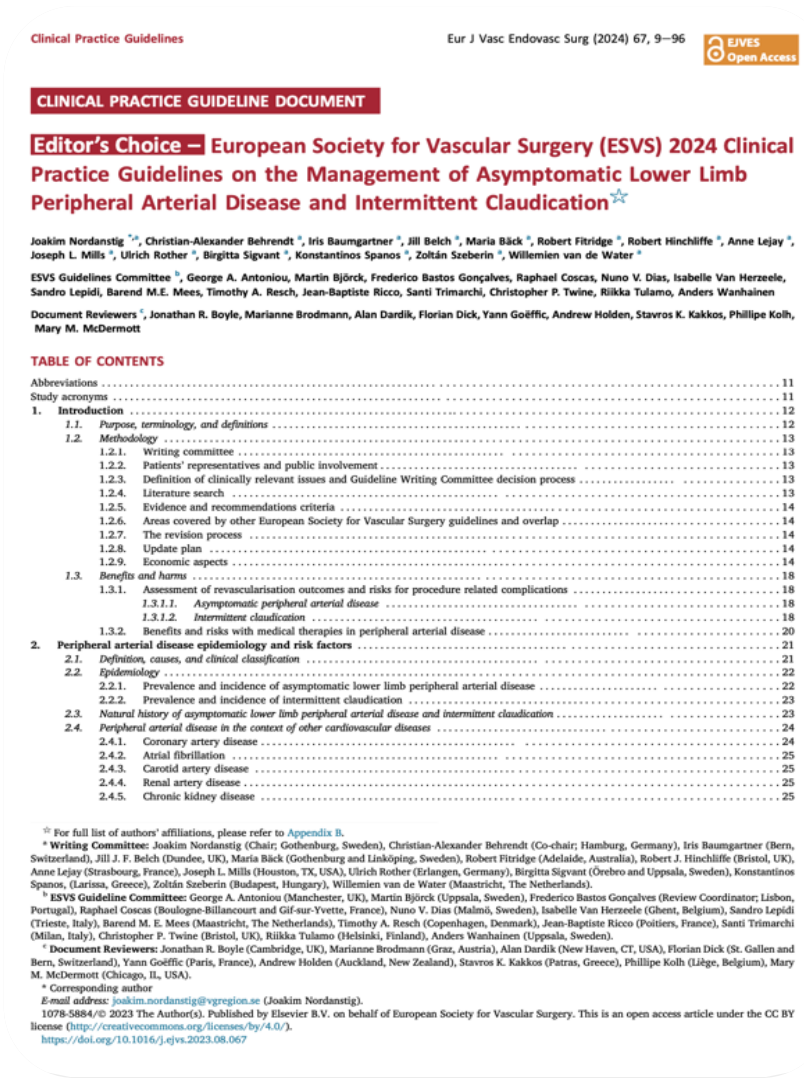

Clinical Practice Guidelines

Eur J Vasc Endovasc Surg (2024) 67, 9–96

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CLINICAL PRACTICE GUIDELINE DOCUMENT

Editor's Choice – European Society for Vascular Surgery (ESVS) 2024 Clinical Practice Guidelines on the Management of Asymptomatic Lower Limb Peripheral Arterial Disease and Intermittent Claudication☆

Joakim Nordanstig [*,*], Christian-Alexander Behrendt [a], Iris Baumgartner [a], Jill Belch [a], Maria Bäck [a], Robert Fitridge [a], Robert Hinchliffe [a], Anne Lejay [a], Joseph L. Mills [a], Ulrich Rother [a], Birgitta Sigvant [a], Konstantinos Spanos [a], Zoltán Szeberin [a], Willemien van de Water [a]

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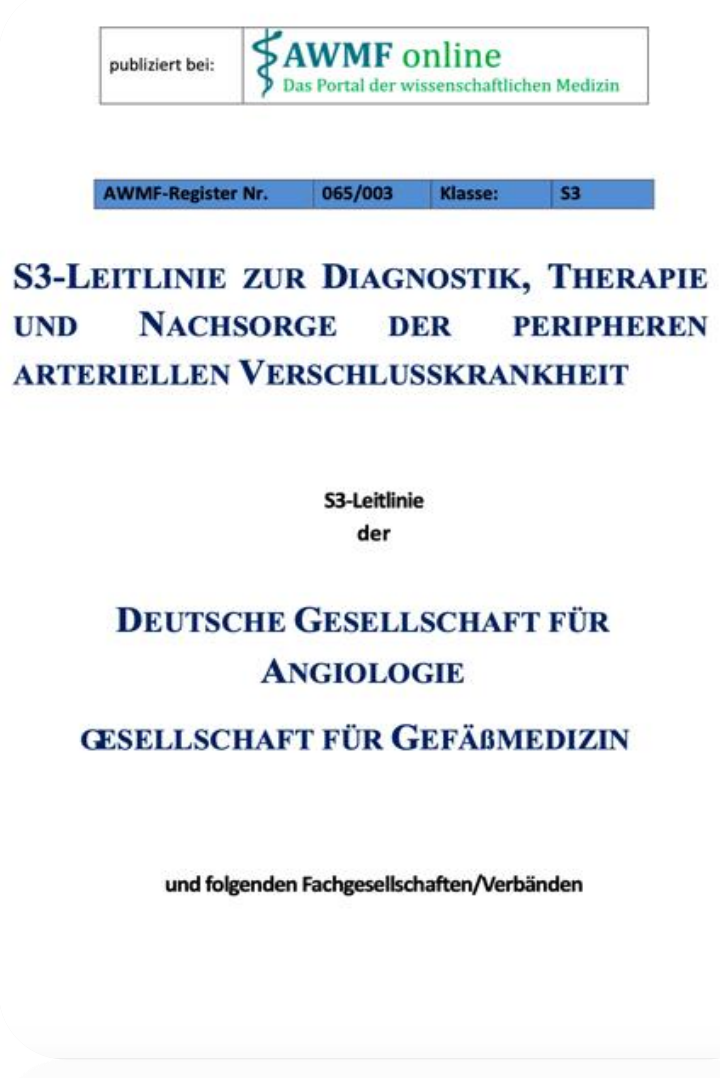

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Geriatric assessment for elderly

- PAD disproportionately affects individuals in the later decades of life, with an estimated prevalence of >15% among those >80 years of age.
- Older patients with PAD have a much higher prevalence of multimorbidity and polypharmacy
- Specifically, the presence of geriatric syndromes, in- cluding frailty and sarcopenia, confers a greater risk for MACE, MALE, and death

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Geriatric assessment for elderly

Table 10. Geriatric Syndromes and Considerations in the Management of PAD in Older Patients

Consideration	Description and Characterization
Frailty	Can be assessed among patients with PAD using measures such as the Clinical Frailty Scale, the modified Frailty Index, the Risk Analysis Index, and others.[11,12] Elevated rates of MACE associated with frailty and claudication.[12] 2-y survival rate was reduced depending on degree of frailty in patients undergoing revascularization for CLTI.[11] Frailty is highly predictive of 30-d mortality rate for all PAD revascularization procedures.[10]
Sarcopenia	Age-related loss of muscle mass.[19,22,23] Sarcopenia was 10 times more prevalent in those with PAD than age-matched controls without PAD.[22] Sarcopenia is associated with lower survival rate[8,9] and higher risk of MACE[9] and MALE.[7] Patients with sarcopenia are at increased risk for muscle mass loss in the lower extremities.[23]
Malnutrition	Common in older patients with PAD, affecting up to 50% of individuals.[13] 5-y survival rate in those with PAD is directly related to GNRI stratification of nutritional risk.[6] In patients with CLTI, 30-d mortality was 5 times higher in those with severe malnutrition compared with those with moderate or no malnutrition.[5] 5-y amputation-free survival rate in patients undergoing surgical revascularization for CLTI was worsened relative to poorer nutritional status.[4]
Mobility impairment	The presence of PAD was associated with poor physical function compared with those without PAD.[3] Ambulatory patients >75 y of age with PAD were 13.51-fold more likely to experience functionally limiting pain than those without PAD.[2] Patients >65 y of age with PAD had a more rapid decline in life-space mobility and a higher mortality rate than those without PAD.[1]
Revascularization considerations	Age >80 y was associated with an increased mortality rate after endovascular or surgical revascularization for infrainguinal PAD.[14,15] Among patients ≥70 y of age with CLTI, those with dependent functional status had a higher mortality rate than those with independent functional status after infrainguinal bypass surgery.[20] Older patients were less likely to be prescribed GDMT (including antiplatelet therapy, statin, and ACE inhibitor/ARB) than those 10 y younger after endovascular revascularization.[21] In patients >70 y of age with CLTI and <2-y predicted survival, a comparison of treatment with medical therapy, endovascular, or surgical revascularization showed no difference in QOL or health status outcomes.[24]
Impact of amputation	Morbidity and mortality rates associated with amputation in older patients are exceptionally high, and mortality rates increased by approximately 4% for every year of age.[25] In older patients with CLTI at high risk for surgery, infrainguinal bypass conferred lower risk of a 30-d mortality rate than amputation.[26] In patients >70 y of age treated for CLTI, 46 of 200 patients underwent amputation within 1 y (23%),[27] with significant improvement in QOL at 6 and 12 mo but no difference in objective measures of health status.
Polypharmacy	Typically described as prescribing ≥5 medications. Increasingly common in older patients (24% of older patients in 2000 and 39% of older adults in 2012).[18,19] Tailoring of medical therapies and shared decision-making are strategies to minimize impact of polypharmacy in older patients with PAD.

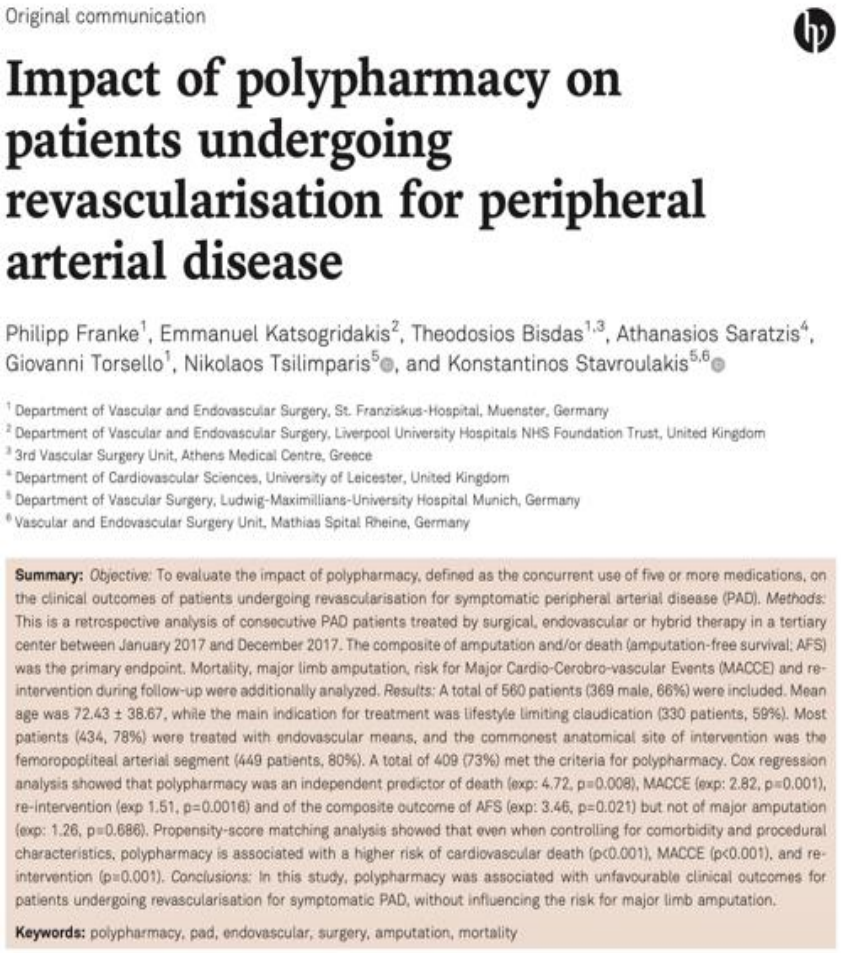
ACE indicates angiotensin-enzyme converting; ARB, angiotensin-receptor blocker; CLTI, chronic limb-threatening ischemia; GDMT, guideline-directed management and therapy; GNRI, Geriatric Nutritional Risk Index; MACE, major adverse cardiovascular events; MALE, major adverse limb events; PAD, peripheral artery disease; and QOL, quality of life.

4.3. Considerations in Management of PAD in Older Patients

Recommendation for Management of PAD in Older Patients
Referenced studies that support the recommendation are summarized in the Online Data Supplement.

COR	LOE	Recommendation
2a	B-NR	1. In older patients (ie, ≥75 years of age) with PAD, assessment for geriatric syndromes (Table 10), such as frailty, sarcopenia, malnutrition, and mobility impairment, can be useful to identify high-risk patients, including before revascularization, and to provide safe and goal-concordant care.[1–15]

Impact of polypharmacy in PAD



Original communication

Impact of polypharmacy on patients undergoing revascularisation for peripheral arterial disease

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Summary: *Objective:* To evaluate the impact of polypharmacy, defined as the concurrent use of five or more medications, on the clinical outcomes of patients undergoing revascularisation for symptomatic peripheral arterial disease (PAD). *Methods:* This is a retrospective analysis of consecutive PAD patients treated by surgical, endovascular or hybrid therapy in a tertiary center between January 2017 and December 2017. The composite of amputation and/or death (amputation-free survival; AFS) was the primary endpoint. Mortality, major limb amputation, risk for Major Cardio-Cerobro-vascular Events (MACCE) and re-intervention during follow-up were additionally analyzed. *Results:* A total of 560 patients (369 male, 66%) were included. Mean age was 72.43 ± 38.67, while the main indication for treatment was lifestyle limiting claudication (330 patients, 59%). Most patients (434, 78%) were treated with endovascular means, and the commonest anatomical site of intervention was the femoropopliteal arterial segment (449 patients, 80%). A total of 409 (73%) met the criteria for polypharmacy. Cox regression analysis showed that polypharmacy was an independent predictor of death (exp: 4.72, p=0.008), MACCE (exp: 2.82, p=0.001), re-intervention (exp 1.51, p=0.0016) and of the composite outcome of AFS (exp: 3.46, p=0.021) but not of major amputation (exp: 1.26, p=0.686). Propensity-score matching analysis showed that even when controlling for comorbidity and procedural characteristics, polypharmacy is associated with a higher risk of cardiovascular death (p<0.001), MACCE (p<0.001), and re-intervention (p=0.001). *Conclusions:* In this study, polypharmacy was associated with unfavourable clinical outcomes for patients undergoing revascularisation for symptomatic PAD, without influencing the risk for major limb amputation.

Keywords: polypharmacy, pad, endovascular, surgery, amputation, mortality

Vasa. 2025 Jan;54(1):35-42.

- retrospective analysis
- consecutive PAD patients
- surgical, endovascular or hybrid revascularization
- tertiary centre
- January 2017 and December 2017
- primary endpoint: amputation-free survival; AFS
- Secondary endpoints: mortality, major limb amputation, risk for Major Cardio-Cerebro-vascular Events (MACCE) and re- intervention

Impact of polypharmacy in PAD

Table IV. Demographics and comorbidities of patients with polypharmacy undergoing revascularisation for symptomatic peripheral arterial disease, and those with less than five medications. Categorical variables are expressed as absolute number (%) and continuous variables as mean ± standard deviation

	Polypharmacy (n = 409)	Non-polypharmacy (n = 151)	p-value
Age (years)	74.54 ± 44.57	66.69 ± 11.20	0.001
Gender (male)	263 (64.30)	106 (70.19)	0.001
Laterality		73 (48.34)	0.924
Right	201 (49.14)	78 (51.65)	
Left	208 (50.85)		
Previous admission	234 (57.21)	59 (39.07)	0.0002
Rutherford class		14 (9.27)	$<10^{-4}$
Class II	20 (4.88)	105 (69.53)	
Class III	225 (55.01)	14 (9.27)	
Class IV	32 (7.82)	15 (9.93)	
Class V	108 (26.40)	3 (1.98)	
Class VI	24 (5.86)		
CLTI	164 (40.09)	32 (21.19)	$<10^{-4}$
HTN	368 (89.97)	93 (61.58)	$<10^{-4}$
Dyslipidaemia	234 (57.21)	49 (32.45)	$<10^{-4}$
DM	182 (44.49)	16 (10.58)	$<10^{-4}$
CHF	177 (43.27)	9 (5.96)	$<10^{-4}$
CKD	144 (35.20)	10 (6.62)	$<10^{-4}$
ESRD	16 (3.91)	0	–

Notes. CLTI: chronic limb threatening ischaemia; HTN: hypertension; DM: diabetes mellitus; CHF: congestive heart failure; CKD: chronic kidney disease; ESRD: end-stage renal disease.

Vasa. 2025 Jan;54(1):35-42.

Impact of polypharmacy in PAD

Clinical endpoints: unmatched populations

Table V. Clinical endpoints of interest at one, two and three years of follow-up, reported separately for the polypharmacy and non-polypharmacy groups, as well as for the total study cohort

	Year 1 Polypharmacy	Non-Polypharmacy	Total	Year 2 Polypharmacy	Non-Polypharmacy	Total	Year 3 Polypharmacy	Non-Polypharmacy	Total
	(n = 409)	(n = 151)	(n = 560)	(n = 409)	(n = 151)	(n = 560)	(n = 409)	(n = 151)	(n = 560)
Death	21 (5.13)	0	21 (3.75)	41 (10.02)	0	41 (7.32)	53 (12.95)	1 (0.66)	54 (9.64)
MACCE	24 (5.86)	0	24 (4.28)	45 (11.00)	1 (0.66)	46 (8.21)	60 (14.66)	3 (1.98)	63 (11.25)
Composite	19 (4.64)	4 (2.64)	23 (4.10)	27 (6.60)	5 (3.31)	32 (5.71)	31 (7.57)	10 (6.62)	41 (7.32)
Amputation	10 (2.44)	3 (1.98)	13 (2.32)	11 (2.68)	3 (1.98)	14 (2.50)	14 (3.42)	5 (3.31)	19 (3.39)
Re-intervention	84 (20.53)	25 (16.55)	109 (19.46)	111 (27.13)	30 (19.86)	141 (25.17)	129 (31.54)	39 (25.82)	168 (30.00)

Notes. MACCE: Major adverse cardiac and cerebrovascular events.

Vasa. 2025 Jan;54(1):35-42.

Impact of polypharmacy in PAD

Matched populations of 151 patients/group

Table VI. Demographics and comorbidities of non-polypharmacy patients undergoing revascularisation for symptomatic peripheral arterial disease and their propensity score matched controls. Categorical variables are expressed as absolute number (%) and continuous variables as mean ± standard deviation

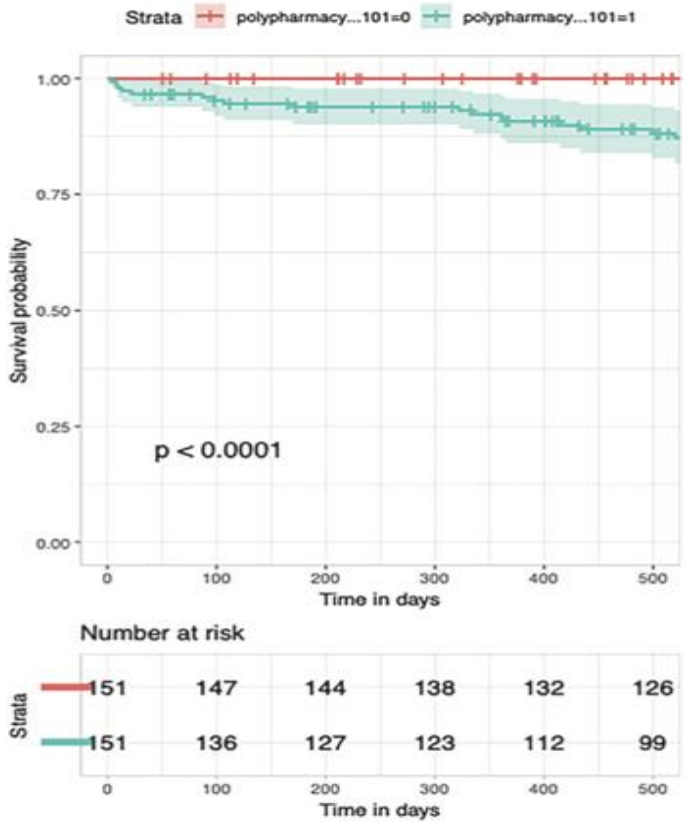
	Polypharmacy Group (n = 151)	Non-polypharmacy Group (n = 151)	p-value
Age	81.29 ± 13.27	76.34 ± 15.42	0.384
Gender (male)	99 (65.56)	103 (68.21)	0.713
Laterality			0.420
Right	70 (46.35)	78 (51.65)	
Left	81 (53.64)	73 (48.34)	
HTN	112 (74.17)	103 (68.21)	0.309
Dyslipidaemia	102 (67.54)	92 (60.92)	0.279
DM	117 (77.48)	106 (70.19)	0.190
CHF	25 (16.55)	16 (10.59)	0.178
CKD	56 (37.08)	23 (15.23)	0.001
ESRD	11 (7.28)	3 (1.98)	0.051
Treatment			
Endovascular	121 (80.13)	110 (70.84)	0.063
Hybrid	11 (7.28)	22 (14.56)	
Open	19 (12.58)	17 (11.25)	0.859
Anatomic location			
Iliac	46 (30.46)	67 (44.37)	0.017
Femoropopliteal	119 (78.80)	120 (79.47)	0.982
Tibial	48 (31.78)	20 (13.24)	0.0002

Vasa. 2025 Jan;54(1):35-42.

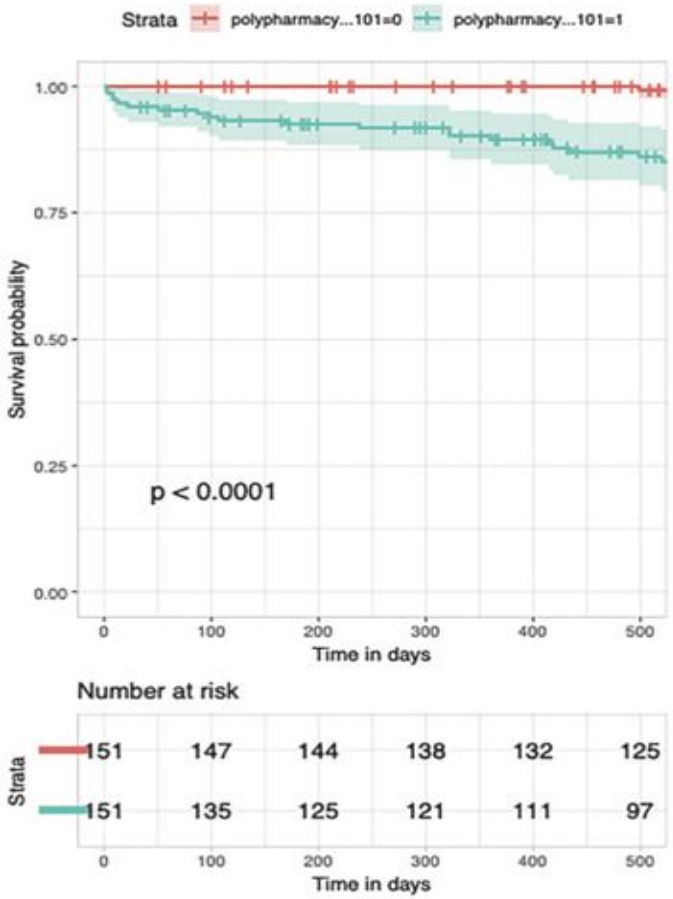
Impact of polypharmacy in PAD

Matched populations of 151 patients/group

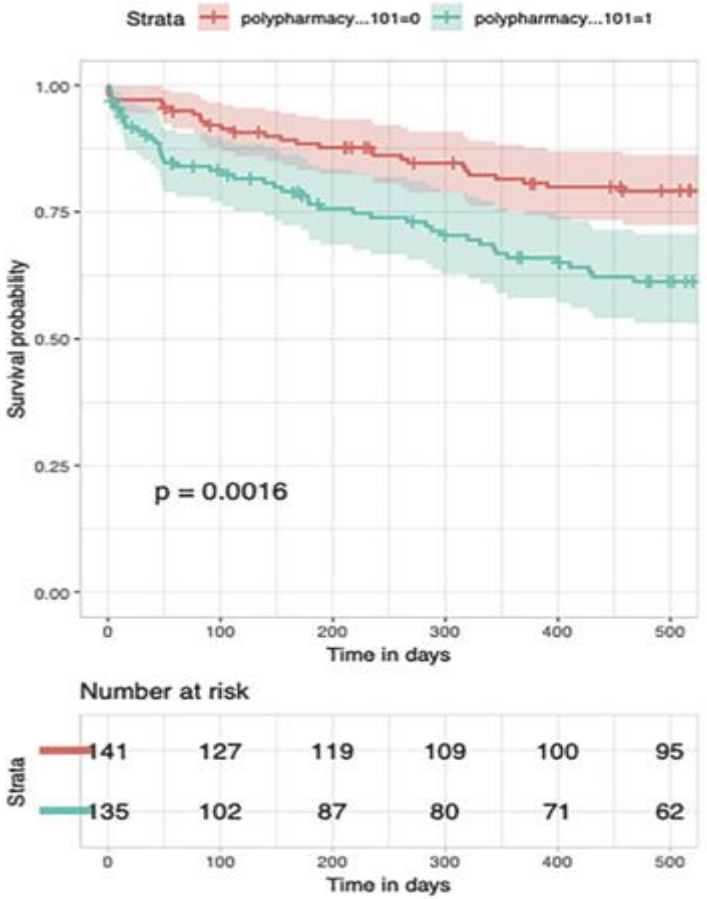
Mortality



MACCE



Re-intervention



Endovascular treatment in nonagenarians

- Retrospective analysis of 81 nonagenarians (mean age 93 ± 2.4 years)
- Endovascular therapy for chronic limb threatening ischemia (CLTI) or claudication
- December 2017 and August 2023.
- The composite of amputation and/or death (amputation-free survival; AFS) was the primary endpoint.
- Technical success, mortality, major limb amputation, risk for Major Adverse Cardio-Cerebro-vascular Events (MACCE) and re-intervention during follow-up were additionally analysed.

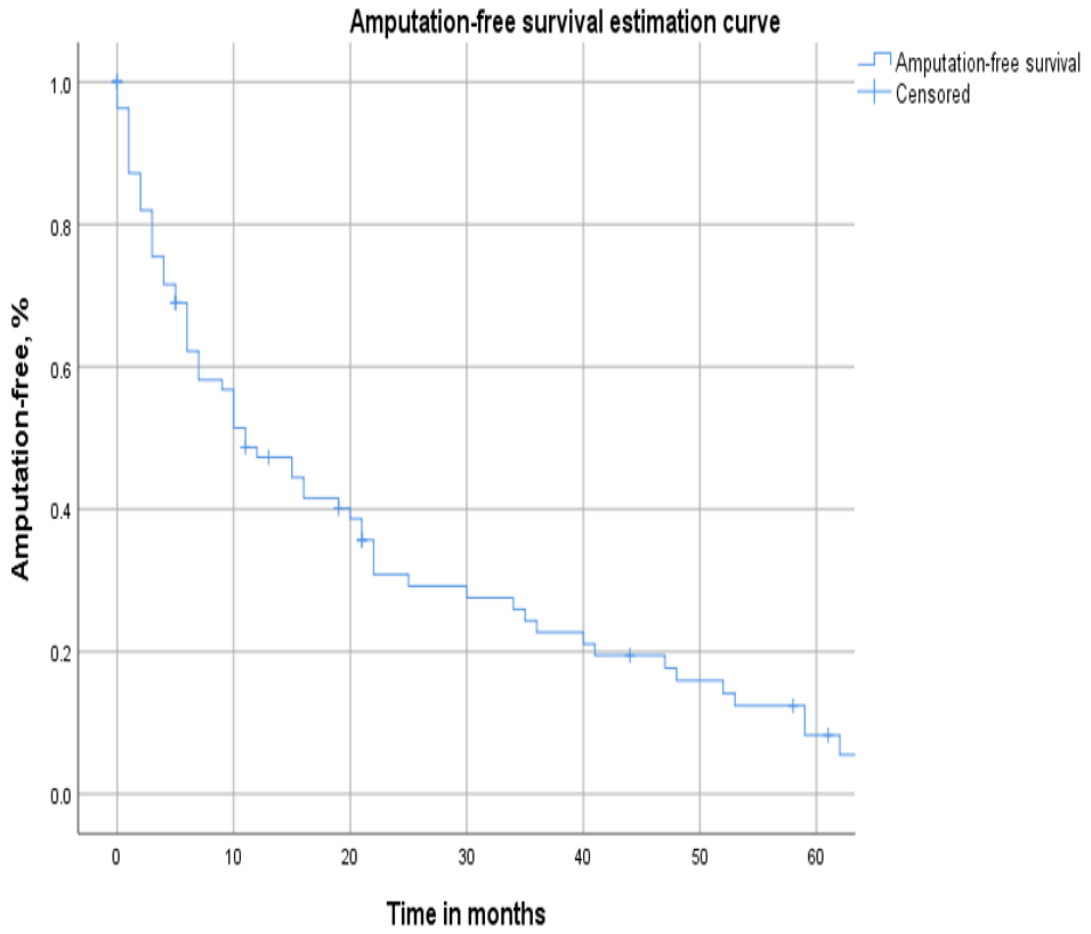
Stavroulakis et al, submitted for publication

Endovascular treatment in nonagenarians

In-hospital Outcomes

	N	N%
Successful revascularization	81	100.0%
Major Amputation	1	1%
Death	1	1%
Morbidity	30	37.0%
Vascular Re-Intervention	6	7%
Minor amputation	6	7%
Non-Vascular Operation	11	14%
ACS	0	0%
AKI	1	1%
New onset Dialysis	0	0%
ICU Stay	7	9%
30 Days Readmission	4	5%

2 years AFS



Endovascular treatment in nonagenarians

- Median follow-up among surviving patients was 61 months (range 0-79 months).
- 4 patients (4.9%) underwent a major amputation,
- 64 patients (79%) died over the follow-up.
- AFS: 23.5%, at 24 months
- Mortality: 75.3% at 24 months
- MACCE: 74.1% at 24 months
- Re-intervention: 14.8% at 24 months

The ROSE-PAD study

Revascularization Outcomes in Symptomatic Elderly with Peripheral Arterial Disease

- Retrospective
- Multicentre
- Nonagenarians
- Revascularization for chronic limb threatening ischemia (CLTI) or claudication
- Endovascular, Open and Hybrid treatment
- December 2017 and August 2023

The ROSE-PAD study

- Primary endpoint: The composite of amputation and/or death (amputation-free survival; AFS)

- Secondary Endpoints: Mortality, major limb amputation, risk for Major Adverse Cardio-Cerebro-vascular Events (MACCE) and re-intervention during follow-up

The ROSE-PAD study

Exclusion Criteria:

- Acute limb ischemia (ALI)
- Aortic or popliteal artery aneurysm related ischemia
- Vascular trauma
- Primary amputation
- Conservative treatment

Conclusions

Geriatric conditions are common in PAD patients

↓

Geriatric conditions are associated with increased risk for adverse events

↓

New guidelines suggest screening for geriatric conditions

↓

Polypharmacy increases the risk for death, MACCE and Re-intervention

↓

Nonagenarians have acceptable in-hospital outcomes, low risk for amputation but high risk for mortality

↓

Need for a multicenter study: Enroll into the ROSE-PAD!

Thank you for your attention